



GIFFARD—ON RHYNCOGONUS BLACKBURNI

eggs, averaging over twenty-eight to a batch, the minimum being fifteen and the maximum fifty-two in the eight batches referred to. My earlier observations disclosed the fact that the females in captivity in large glass breeding jars oviposited to a much greater extent than when placed under a net on branches of the tree in the open, and these later investigations further show that in the smaller enclosure (a jam jar) the oviposition was still more rapid and that the batches contained a much larger percentage of eggs than in the previous experiments.

The sexes of the beetles comprising the whole colony under observation (including those bred in jars) has been determined as thirteen males and eight females.

At the beginning of the outdoor experiments referred to, koa trees were searched for egg batches and after much labor one leaf was found apparently similar in appearance to those produced by the colony. This leaf was taken home and placed in a glass test tube and ten days later instead of the larvae I found that Chalcid parasites were emerging, eleven of which were saved and three or four others accidentally lost. At this early period of my observations it was not certain, however, that this Chalcid was a true parasite of the egg of *Rhyncogonus*, but that it really was such was afterwards proven. One of the egg batches which had been left exposed on the tree, at a subsequent visitation, was placed in a glass tube and some of the eggs began hatching on the sixth day after their removal from the tree. Noticing but few larvae emerging from this particular batch, it was left in the tube for a longer period than usual and nineteen days later two Chalcid parasites emerged through the protecting leaf cover of the egg mass. This fact and later investigations of the remaining eggs proved conclusively that these Chalcids were similar to the previous species above referred to, and that they were true egg parasites. Both these Chalcids, as well as the previous lot, were identified by Dr. Perkins as an Eupelmid (Text Fig. on p. 133). I understand Dr. Perkins intends to supplement my observations on the breeding of this parasite by a few notes of his own, which may further elucidate its habits.

EXPLANATION OF PL. 3.

Fig. 1. *Rhyncogonus blackburni* ♀; fig. 2. ♂ of the same; fig. 3. Koa leaves enclosing egg batch; fig. 4. Egg batch exposed.

Supplementary Notes on *Rhyncogonus blackburni* and Its Parasites.

BY R. C. L. PERKINS.

(With figure)

In the Annual Address to this Society for the year 1905, after giving an account of the insects inhabiting a portion of the mountains near Honolulu, in some concluding remarks I observed that "to know the life-history of *Rhyncogonus blackburni* and why it remains so comparatively weak in individuals, or to fully ascertain the life-history of some of the Carabids, and why again some are so common, others so extremely rare, would be far more interesting than the discovery of half a dozen new *Proterhinus* which would surely differ but little from species already known." From Mr. Giffard's interesting paper just read, it will be seen that the desired information as to the *Rhyncogonus* is now largely supplied.

The distribution on Oahu of *Rhyncogonus blackburni* is not exactly known, but it is almost certainly absent from the Northern third of the long Koolau range, which has been much collected over, and it is probably absent from the middle third also. It has never been taken, in fact, on any part of the range north of Nuuanu Valley, which very possibly limits its distribution. It occurs throughout the mountains south of Nuuanu, wherever they have been investigated, but only at certain elevations being absent from the higher and wetter portions of the range. It is partial to many other trees besides *Acacia koa*, such as *Straussia*, *Euphorbia*, etc., and is even found on ferns such as *Gleichenia dichotoma*. It is absent from, or at least has never been found in the Waianae range of mountains. In its own limits it is overlapped by *R. koebelei* and possibly other species, and outside the limits it is replaced by several other forms at present undetermined. It is rather of a social nature (being like other *Rhyncogonus* in this respect) so that not infrequently four or five individuals will be found in company, sometimes even closely packed together, when at rest, and the sexes are usually *in coitu*. In beating trees, it is often found singly, but this is no doubt due to the fact that some fall clear of the beating cloth or umbrella, and consequently are not noticed.

The large size of the beetles (as compared with most native Coleoptera) and their extreme tenacity of life under almost any

circumstances as well as the ease with which they are collected, when considered in connection with the sparseness of individuals, rendered it almost certain that they would be subject to the attacks of parasites. It was also certain that these parasites when discovered would be of small size and that a moderate sized Ichneumonid or Braconid was not to be looked for, since none such (other than can be otherwise accounted for) are to be found in the haunts of *Rhyncogonus* throughout the islands. Through Mr. Giffard's perseverance, we are now able to say that one check, and no doubt a very important one, to the multiplication of *Rhyncogonus blackburni* is an egg-parasite of the genus *Eupelmus*, the species being previously undescribed. From the specimens of egg-masses of the beetle submitted to me by Mr. Giffard, from which two of the parasites had emerged, I suspect that one egg affords sufficient food for one parasite, though the latter is of large size for the amount of nutriment that it would thence obtain. When I exposed these egg masses by separating the koa leaves, which were very firmly glued together and concealed them, in both cases I found the remaining eggs, together with some dead larvae of the beetle, to be covered with a mass of minute Acari, which had partially devoured them, as also several still immature pupae of the *Eupelmus*. The attacks of Acarids are frequently a cause of great trouble in rearing insects in captivity in these islands, but seem to be of comparatively small account under natural conditions. The two parasites, that had emerged from one of the egg-masses had escaped by the same round hole gnawed through the Acacia leaf. The other eggs-mass had also been parasitized, but the contents all destroyed by the Acarids. Probably the *Eupelmus*, like some other egg-parasites, will only attack the eggs when comparatively freshly laid, and the extremely wet weather would sufficiently account for the fact that not more of the egg-masses, exposed to parasitic attack by Mr. Giffard, were parasitized. No doubt, in many of the eggs experimented with, embryonic development had already advanced too far before their exposure to parasites. It is noteworthy that the one egg-mass found under natural conditions yielded parasites only.

The Hawaiian species of *Eupelmus* are numerous, and the parasite of *Rhyncogonus* is one of the smallest of these. The genus as represented in the islands is very remarkable for the diversity in habits of the different species. One is known to be parasitic on Coleopterous larvae (Anobiidae), one has been

bred by Mr. Swezey and myself from the puparium of the Neuropterous *Anomalochrysa*, and one by Mr. Terry from the eggs of the Locustid, *Brachymetopa*. Another I have bred freely from very rotten wet wood, which yielded otherwise only Lepidopterous (Gelechiid) larvae, but in this case the host is necessarily uncertain.

The species are very difficult to determine, being variable, and with extreme sexual dimorphism, so that the sexes can not possibly be correlated except by breeding. Judging by the bred specimens I have examined, there is no such variation in the length of the ovipositor, as Ashmead allows in his descriptions in the Fauna Hawaiiensis, and the sexes are almost certainly wrongly assigned in that work. I have somewhat reluctantly described this egg-parasite of *Rhyncogonus*, for though I am quite satisfied it is undescribed, I do not feel that the material of this genus that is accessible to me for study at the present time, is sufficient for a proper understanding of the importance of specific characters in the Hawaiian species. Nothing is likely to prove a greater hindrance to the advance of knowledge of the Hawaiian fauna than the description of new forms off-hand in these difficult genera of many endemic species, when one is imperfectly acquainted with the value of their characters, and these can only be appreciated after studying a comprehensive collection. The material accessible to me for study and comparison is less than two hundred specimens of indigenous *Eupelmus* and I should be very pleased to obtain specimens (which are the most easily collected of all native Chalcids) from the members of the Society. With a thousand examples from various localities, an adequate knowledge of the Hawaiian forms might be obtained and the Hawaiian species redescribed to advantage. The fact that this species has been bred, and the interest that attaches to it in connection with Mr. Giffard's paper on the habits of *Rhyncogonus blackburni*, may excuse the deficiencies, which will no doubt be subsequently found, in my description.

Eupelmus rhyncogoni sp. nov.

Female, metallic green, the face blue-black or purplish black, the thorax and head with more or less brassy reflections in parts, the abdomen usually metallic blue, green in part; the scape of the antennae, all the legs including the coxae, and the mesopleura are testaceous; the scape is darker, more brown